

# Lichens of Eastern Axel Heiberg Island and the Fosheim Peninsula, Ellesmere Island, Northwest Territories

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One hundred and seventy-nine lichen taxa are listed from these high arctic islands: 149 from Axel Heiberg Island, 129 of them not previously listed; 99 from Ellesmere Island, 37 not previously listed. New to Canada are *Acarospora cartilaginea*, *Aspicilia cingulata*, *A. contigua*, *A. humboldtii*, *Buellia nivalis*, *Caloplaca alcarum*, *Lecidea sublimosa*, and *L. tenuissima*. New combinations are: *Aspicilia contigua* (Lyngé) Thoms., *Aspicilia humboldtii* (Lyngé) Thoms., and *Aspicilia nathorstii* (Lyngé) Thoms. Three lichen parasites, *Discothecium gemmiferum*, *Rhabdospora lecanorae*, and *Tichothecium pygmaeum*, are also listed.

Key Words: Lichens, Axel Heiberg Island, Ellesmere Island, Northwest Territories.

As part of a natural resource survey, sponsored by Parks Canada, the second author made a collection of lichens from eastern Axel Heiberg Island and the Fosheim Peninsula of Ellesmere Island during July 1980. The lichen flora of that region is virtually unknown.

## Study Area

The location of the collection area, east of the mountains of Axel Heiberg Island and west of the mountains of Ellesmere Island, is responsible for its "continental" type climate. The high ice-capped mountain ranges on Ellesmere Island present a barrier to the entry of mild, moist air from the North Atlantic. Similarly, the mountains of Axel Heiberg Island provide an effective barrier to maritime influences from the west. The climate of most islands of the Arctic Archipelago is influenced by the marine channels lying between them. However, Eureka Sound, Nansen Sound and Greely Fiord are never completely free of ice and therefore have little influence on the climate of the area.

The "continental" climate is characterized by warmer summers, colder winters and lower precipitation than experienced in maritime areas. Mean daily temperatures in the area range higher in the summer than other locations in the northern Arctic Archipelago. The warmer weather in the summer months accounts for the greater number of frost-free days at Eureka (66) compared to Alert (29) and Isachsen (27). The region is one of the driest regions in the world. The average annual precipitation at Eureka is 58.4 mm, 22.4 mm of that falling as rain.

A major factor influencing climate is the formation of a north-south oriented high pressure ridge in late winter. By April, this high pressure area spreads over

the entire Arctic Archipelago and is associated with predominantly light winds and clear skies in April and May (Rae 1951). A drop in mean pressure occurs in June and July and low overcast stratus clouds are prevalent in the spring and summer months. Offsetting this is the fact that snowmelt is largely complete by this time throughout much of the archipelago and increased convection from solar heating of the ground surface results in a decrease in cloud cover (Rae 1951). The Eureka area receives less cloud cover than other locations in the archipelago, particularly in March, May and August. The region is subject to potentially continuous daylight from 15 April to 31 August. Fog and cloud cover is less frequent than other high arctic locations.

Roots (*in* Fortier et al. 1963) divided the area into two major physiographic subdivisions, the Ridged Uplands and the Eureka Sound Uplands. The Ridged Uplands consist of a range of mountains extending in a north-south direction. The ridges are often broad, widening into upland surfaces of irregular extent. A well-developed trellis drainage pattern is evident, with short, but fast-flowing creeks originating on the ridges at regular intervals. The valley walls are often steep and the steep mountains rising from the sea form spectacular scenery. The mountain chain is cut by Buchanan Lake, but it continues to the northwest with about the same altitude, but generally lowering relief. The highest peaks reach about 1300 m above sea level, occurring both northwest and southeast of Buchanan Lake. A few small, isolated icecaps occur on the highest peaks, but the ice accumulation is not sufficient to sustain glacier flows.

Eureka Sound Uplands area consists of generally low, but varied topography, drained by a well-developed dendritic pattern of streams. The major

streams originate in the glaciers reaching down from the mountains in the west. Three main physiographic elements can be recognized, occurring interspersed with one another: rolling uplands, low mountain ranges and broad lowlands. The main element in this physiographic unit is a rolling upland that occurs generally below the 300-m contour. The relief is generally less than 75 m, with broad valleys and low ridges although some streams may be incised to a greater depth. The rolling uplands are interrupted by low mountains that have peak elevations between 550 m and 840 m. These areas may consist of single peaks, or mountainous chains up to 25 km long. Although the elevations are not high, steep rocky cliffs are abundant. The third element of this physiographic unit is characterized by low relief. Flat, featureless plains extend for long distances south of Schei Peninsula and in other low-lying areas. Poorly drained lowlands, some with small ponds are frequent.

Most of the area is stratigraphically in the sedimentary Sverdrup Basin, and structurally within the Eureka Sound fold belt (Fortier et al. 1963). The stratigraphic units range from the Permo-Carboniferous, through the Mesozoic into the Tertiary and constitute a conformable sequence of marine and non-marine deposits. Volcanic basic flows are of Permo-Carboniferous and Cretaceous ages. All formations were folded simultaneously and the orogeny took place in the Tertiary, as even the early Tertiary Eureka Sound formation was folded along with the older formations. Gypsum of Permo-Carboniferous age was deformed and intruded into younger rocks following the intense period of orogeny during the Tertiary. The geology of the area was intensively studied in the 1950s and 1960s and details are available in reports by Fortier et al. (1963), Tozer (1963), and Thorsteinsson (1974) and maps by Thorsteinsson (1971a, 1971b), and Thorsteinsson and Trettin (1972).

Permafrost underlies all land surfaces. The thickness of the frozen layer is not known, but it certainly amounts to several hundreds of metres. The ice content of the permafrost is variable. Ice-rich permafrost is found near the surface in fine-grained soils having imperfect to poor drainage. The seasonally thawed surface layer, the active layer, varies in thickness at its maximum development according to different soil materials and vegetation cover.

Intensive frost action and numerous freeze-thaw cycles initiate processes in the ground that result in frost heaving and churning of the soil (cryoturbation). Various surface forms attributed to frost action, such as earth hummocks, mudboils, mini-mounds and upland and lowland polygons, are common in the area.

Soil parent materials include glacial till, colluvium,

marine deposits and alluvium. All soils belong to the Cryosolic Order, as permafrost occurs within 1 m of the surface everywhere. Both Turbic and Static Great Groups are present.

The vegetation of the area is dominated by polar semi-desert community types, with local areas of arctic tundra. The composition of the flora reflects high arctic elements, with a representation of low arctic species. Vegetation types include dwarf shrub with *Dryas* barren and barren heath subtypes, dwarf shrub-sedge, sedge with sedge meadow and seepage slope subtypes, dry steppe and upland seepage.

Latitudes, longitudes, elevations in meters (asl) and dates at the collection sites were as follows:

#### Axel Heiberg Island

A-1	79° 54'N, 87° 43'W	75 m	19 July 1980
A-2	80° 02'N, 88° 45'W	175 m	19 July 1980
A-3	80° 01'N, 88° 48'W	140 m	19 July 1980
A-4	80° 07'N, 88° 12'W	30 m	19 July 1980
A-5	80° 17'N, 88° 27'W	215 m	19 July 1980
A-6	80° 24'N, 87° 38'W	6 m	19 July 1980
A-7	80° 11'N, 87° 46'W	135 m	19 July 1980
A-8	79° 49'N, 87° 32'W	45 m	20 July 1980
A-9	79° 46'N, 87° 18'W	530 m	20 July 1980
A-10	79° 41'N, 87° 31'W	120 m	20 July 1980
A-11	79° 41'N, 87° 25'W	135 m	20 July 1980
A-12	79° 38'N, 87° 27'W	665 m	20 July 1980
A-13	79° 37'N, 87° 42'W	275 m	20 July 1980
A-14	79° 33'N, 87° 32'W	195 m	20 July 1980
A-15	79° 27'N, 87° 38'W	90 m	21 July 1980
A-16	79° 15'N, 87° 43'W	355 m	21 July 1980
A-17	79° 05'N, 87° 22'W	410 m	21 July 1980
A-18	79° 14'N, 86° 10'W	165 m	21 July 1980
A-19	79° 22'N, 86° 15'W	90 m	21 July 1980
A-20	79° 39'N, 89° 42'W	1220 m	22 July 1980
A-21	79° 46'N, 88° 46'W	410 m	22 July 1980
A-22	79° 35'N, 87° 23'W	8 m	22 July 1980
A-23	79° 20'N, 86° 38'W	180 m	22 July 1980
A-24	79° 15'N, 85° 30'W	145 m	22 July 1980

#### Ellesmere Island

E-1	79° 59'N, 85° 50'W	6 m	16-18 July 1980
E-2	79° 43'N, 85° 50'W	150 m	20 July 1980
E-3	80° 06'N, 85° 37'W	135 m	22 July 1980
E-4	80° 12'N, 85° 12'W	105 m	22 July 1980
E-5	81° 06'N, 85° 51'W	6 m	22 July 1980
E-6	81° 00'N, 84° 50'W	150 m	22 July 1980
E-7	80° 49'N, 85° 55'W	455 m	22 July 1980
E-8	80° 03'N, 85° 30'W	760 m	22 July 1980
E-9	79° 52'N, 85° 10'W	30 m	24 July 1980

The first set of voucher specimens were deposited in the herbarium, University of Wisconsin, Madison

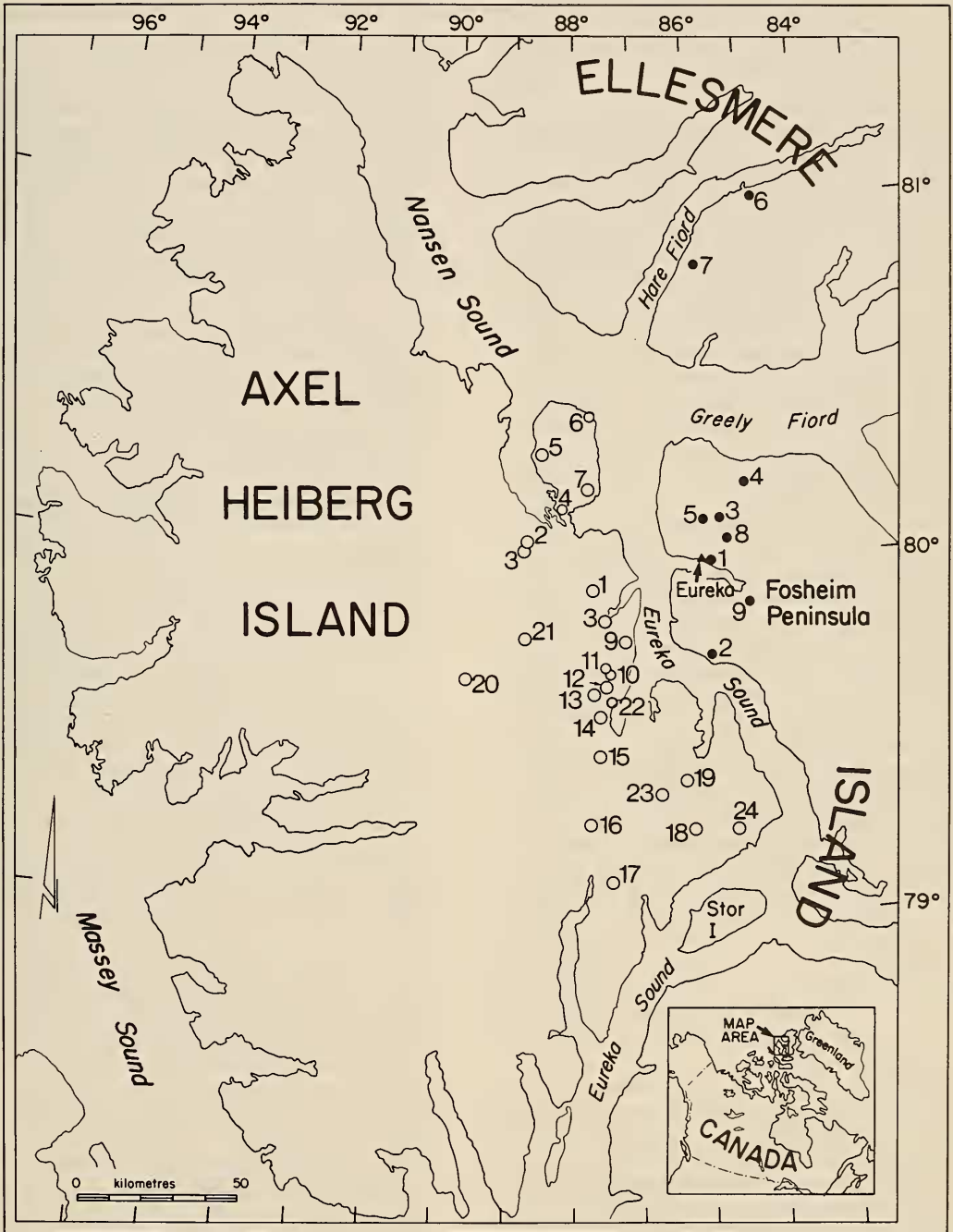


FIGURE 1. Map of the collection sites. Those with open circles on Axel Heiberg Island are prefixed with A in the listings; those with closed dots on the Fosseim Penninsula are prefixed with E in the listings.



(WIS). Some duplicates were deposited in the herbarium of the Canadian Forestry Service, Edmonton (CAFB). All identifications were by J.W. Thomson.

### Previous Investigations

Early records of lichens from Ellesmere Island have been summarized by Lynge (1947) in his paper on the lichens of the Canadian Eastern Arctic. The earliest paper of note, based on the collections made on the English Polar Expedition of 1875–76, was written by T. M. Fries (1879). The Ellesmere Island collections were made along the east coast in the sections then called Ellesmere Land, Grinnell Land, and Grant Land. Fries listed 102 lichens, several new to science, including *Parmelia (Xanthoparmelia) separata*, *Caloplaca celata*, *Lecidea scrobiculata*, *Lecidea despecta*, *Lecidea ultima*, *Microglæna sordidula*, *Verrucaria phleothelena*, and *Microthelia melanostoma*.

During the Lady Franklin Bay Expedition of 1881–1884 only seven lichens were collected (Lehnert and Greely 1888) and these were determined by Lehnert. A very large number of lichens were collected during the "Fram" Expedition of 1898–1902. They were reported upon by Darbishire (1909) but the quality of the determinations was severely criticized by Lynge (1947) and the material has not been restudied. Eight species were described as new to science: *Lecidea purissima* (= *Lecidea marginata* Schaer. according to Hertel 1967), *Lecidea solitaria*, *Catillaria sanguinaria*, *Catocarpon depressum* (= *Rhizocarpon chioneum*), *Pertusaria determinanda* (= *Pertusaria subplicans* Nyl.) *Placodium splendens*, (= *Xanthoria elegans* var. *splendens*), *Aspicilia lesleyana*, and *Aspicilia nikrapensis* (= *Lecanora candida* var. *nikrapensis* (Darb.) Magn. = *Aspicilia candida* (Anzi) Hue). Darbishire's list is composed of other arctic records as well as the material from Ellesmere Island. Of the 495 species listed only 158 are actual records from Ellesmere Island, and three are also from Axel Heiberg Island. Schuster, Steere and Thomson (1959) listed 108 species, including 113 taxa, from the north end of Ellesmere Island. Powell (1967) added records of 38 lichens from the Lake Hazen area in the interior of northern Ellesmere Island.

Axel Heiberg Island is poorly represented in previous reports. Thomson (1960) included three species collected by A. Innes-Taylor on the island as well as 20 species from Ellesmere Island. These are in CANL. Marian Kuc collected 21 species at Good Friday Bay, southern Axel Heiberg, in 1957 and reported on them in 1969. Kuc made a much more intensive collection at the head of Expedition Fiord near White Glacier, 91°45'N, 79°25'W, but these have not been reported on and are filed at CANL with some duplicates at WIS. Thus the majority of the species reported here are new for that island.

### List of Species:

\*indicates new to Ellesmere Island.

†indicates new to Axel Heiberg Island.

+ *Acarospora cartilaginea* Magn. A23(46448). This species was described from Greenland and is new to North America. Like *A. fuscata* it is a brown species with a C+ red reaction of the cortex and a dark underside. The hymenium is higher, 100–135  $\mu$ , instead of the 85–100  $\mu$  in *A. fuscata*. The cortices as described by Magnusson are very comparable, 30–40  $\mu$  in this, 25–50  $\mu$  in *A. fuscata*. Quite possibly this species represents only an extreme in the ambit of *A. fuscata*.

+ *A. chlorophana* (Wahlenb.) Mass. A20 (46417).

+ *A. fuscata* (Nyl.) Arn. A14 (46365).

+ *A. peliocypha* (Wahlenb.) Arn. A14 (46378).

\* *A. pyrenopsoides* Magn. E1 (46457).

+ *A. scabrida* Hedl. A14 (46367).

+ *A. veronensis* Mass. A4 (46306).

*Alectoria nigricans* (Ach.) Nyl. A2 (46023), A16 (46142), A18 (46173), A21 (46187), E1 (46236), E2 (46241).

*A. ochroleuca* (Hoffm.) Mass. A2 (46030), A5 (46083), E1, (46237), E8 (46268).

\* *Aspicilia alpina* (Sommerf.) Arn. E8 (46537). The specimen is a sterile thallus but has the appearance and chemical reactions of this species, I+ blue, K+ red and containing norstictic acid in o-T test.

\*\* *A. anseris* (Lynge) Thoms. A4 (46302), A14 (46374), A23 (46437), E1 (46458), E6 (46524).

+ *Aspicilia arctica* (Lynge) Oxner. Site A21 (46427).

\*\* *Aspicilia cingulata* (Zahlbr.) Oxner. Sites: A4 (46308), A6 (46331), A7 (46333), A14 (46376, 46377), A23 (46433), E1 (46454). In *Aspicilia cingulata* there is a more or less continuous thallus with a flattened continuous orbicular, zonate appearance. Over this are bordering radiating elongated areolae which are more or less contiguous. Centrally the areolae are shorter and more angular. Excellent habit photographs are in Zahlbruckner (1928) in Plate I, Figure 2 (sub *Lecanora plicigera*) and Plate II, Figure 2. The thallus color is a brownish or yellowish gray and the reaction with K is negative. The paraphyses are non moniliform in this species. This species was previously known from Novaya Zemlya, Alaska, Bylot Island, and northern Baffin Island, and is probably circumpolar high Arctic.

+ *Aspicilia contigua* (Lynge) Thoms. comb. nov. Basionym: *Lecanora contigua* Lynge, Skrifter om Svalbard og Ishavet 81: 93. 1940. A2 (46295), A4 (46313). *Aspicilia contigua* has a similar aspect to *A. cingulata*, that is a thin generally zonate hypothallus over which lie radiating areolae. In the latter species the radiating areolae are touching

- each other, whereas in *A. contigua* they are separate with spaces between the "lobing" so that they appear more discrete. The paraphyses in *A. contigua* are moniliform. *Lecanora circularis* Magn. differs in having larger apothecia, 0.5–1.2 mm vs. 0.3–0.4 mm and the marginal lobate areolae about 0.5 mm rather than 0.2 mm. These may however represent phases of the same species. *A. contigua* is illustrated in Lyngé (1940) Plate VI, Figure 1. These species are also very similar in appearance to *Aspicilia perradiata* (Nyl.) Hue which, however, has a K<sup>+</sup> yellow reaction on account of an atranorin content.
- A. flavida* (Hepp) Rehm. E1 (46484), E2 (46500).
- + *Aspicilia humboldtii* (Lyngé) Thoms. comb. nov. Basionym: *Lecanora humboldtii* Lyngé, Skrifter om Svalbard og Ishavet 81: 97. 1940. A4 (46314). This species is another of the Orbiculares group of *Aspicilia* with radiate areolae over a dark hypothallus and a K-reaction. It is distinguished by its large areolae 1.1–1.5 mm broad in the central thallus, to 0.35 mm in the marginal lobes, a high hymenium 125  $\mu$ , thick cortex 50–60  $\mu$  and large spores 20–25  $\times$  10–15  $\mu$ . This species was previously known only from the type locality Cape Humboldt in northeast Greenland. It is illustrated in Lyngé (1940) Plate VIII, Figures 1 and 2.
- A. lesleyana* Darb. All (46337).
- \* *Aspicilia nathorstii* (Lyngé) Thoms. comb. nov. Basionym: *Lecanora nathorstii* Lyngé, Skrifter om Svalbard og Ishavet 81: 83. 1940. Site E1 (46350). This species belongs in the Effusae section of *Aspicilia* as it lacks marginal radiation of its areolae. Its spores are small, 14–22  $\times$  8–13  $\mu$ , the hymenium low, 75  $\mu$ , and the thallus reported as slightly roseate by Lyngé seems only grayish white. The areolae are indistinct in the type specimen which is illustrated in Lyngé (1940) Plate II, Figure 1.
- A. nikrapensis* Darb. E2 (46497), E6 (46516). This lichen is also placed as *Lecanora candida* var. *nikrapensis* (Darb.) Magn. or *Aspicilia candida* var. *nikrapensis* (Darb.) Oxner, Nov. Syst. Pl. non Vasc. 19: 287. 172. It has in addition been called *Lecanora lyngéi* Zahlbr. and under that name illustrated in Zahlbruckner (1928) Plate II, Figure 1. It has only slightly radiate marginal areolae, a rather thick thallus usually, and pruinose disks with a markedly black border. The thallus is very soft chalky.
- A. perradiata* (Nyl.) Hue E1 (46469), E2 (46486).
- A. plicigera* (Zahlbr.) Räs. A23 (46444).
- \* *A. rosulata* Körb. E1 (46451).
- + *Bryoria chalybeiformis* (L.) Brodo & Hawksw. A2 (46017), A18 (46172).
- + *B. nitidula* (Vain.) Brodo & Hawksw. A2 (46033).
- Buellia alboatra* (Hoffm.) Tuck. E1 (46470).
- B. geophila* (Sommerf.) Lyngé E7 (46263).
- + *B. leptocline* (Flotow) Körb. A21 (46431).
- + *B. nivalis* (Bagl. & Carest) Hertel ex Hafellner (*Polyschistes nivalis* (Bagl. & Carest) Keissl. Growing on *Xanthoria elegans*. This rarely noted species has previously been reported from the Alps and the Scandinavian mountains in Europe, from Novaya Zemlya and Greenland. Hertel reported it from Alaska from collections on *Xanthoria sore-dia* at the Pitmegea River, Thomson 10 571. It may be recognized by the necrotic areas it causes on the host. The spores are 3-septate to muriform. It was found at site A14 (46380). New to Canada.
- + *B. papillata* (Sommerf.) Tuck. A2 (46028), A5 (46070), A11 (46122), A13 (46139), A21 (46179), E1 (46222), E3 (46249).
- + *B. stigmatea* Körb. On caribou antler. A1 (46389).
- + *Caloplaca alcarum* Poelt. On sandstone. A14 (46348). This species, published by Poelt in a paper on the lobate species of *Caloplaca* in Europe (Mitt. Bot. Staatss. München 11: 11–31. 1954) on page 25 is equivalent to *Caloplaca murorum* var. *obliterata* Vain. in the sense however of Lyngé. It produces small thalli usually covered densely by apothecia and with but few short bordering lobes. It actually differs from *C. murorum* var. *obliterata* in producing slightly larger spores 10.5–14  $\times$  4.5–8  $\mu$  instead of 8–16  $\times$  2.5–7  $\mu$  with the septum more definite than the poorly developed septum of *C. murorum*. The paraphyses tips are 6  $\mu$  instead of the 7–9  $\mu$  *C. murorum*. This species was previously described from Novaya Zemlya in the Arctic and is a species associated with bird dunging. A photo is provided in Lyngé (1928) Plate X, and drawings of spores and a paraphysis are in Plate 5, Figures 32–34.
- + *C. cinnamomea* (Th. Fr.) Oliv. A2 (46038), A4 (46059).
- \*\* *C. festiva* (Ach.) Zwack. On caribou antler. A1 (46285), E1 (46482).
- \* *C. invadens* Lyngé. E2 (46488).
- + *C. stillicidiorum* (Vahl) Lyngé A1 (46287), A2 (46037), E1 (46231).
- + *C. tetraspora* (Nyl.) Oliv. A2 (46013), A4 (46062), A17 (46158).
- + *C. tirolensis* Zahlbr. A1 (46283), A2 (46049), A3 (46049), A5 (46086), A17 (46150), E1 (46201), E3 (46251), E7 (46259).
- + *Candelariella aurella* (Hoffm.) Zahlbr. On caribou antler and rocks. A1 (46281), A14 (46355).
- C. dispersa* (Räs.) Hakul. On thallus of *Placynthium aspratile*. E6 (46512).
- + *C. terrigena* Räs. A2 (46012), A4 (46058), A5

- (46066), A16 (46144), A17 (46157), A23 (46194).  
*Cetraria cucullata* (Bell) Ach. A2 (46040), A16 (46140), E1 (46220).  
*C. delisei* (Bory) Th. Fr. A5 (46063), A12 (46124), E9 (46273).  
<sup>+</sup>*C. fastigiata* (Del. ex Nyl. in Norrl.) Kärnef. A5 (46084), A9 (46100).  
*C. nivalis* (L.) Ach. A5 (46072), A7 (46093), A10 (46112), A11 (46113).  
*Cladonia amaurocraea* (Flörke) Schaer. A7 (46094).  
<sup>+</sup>*C. cariosa* (Ach.) Spreng. A5 (46078).  
<sup>+</sup>*C. coccifera* (L.) Willd. A2 (46016), A17 (46167).  
<sup>+</sup>*C. macrophylla* (Schaer.) Stenh. A6 (46089).  
<sup>+</sup>*C. pocillum* (Ach.) O. Rich. A2 (46018), A5 (46064), A9 (46098), A11 (46118), E1 (46238), E7 (46266).  
<sup>+</sup>*C. pyxidata* (L.) Hoffm. A18 (46176).  
<sup>\*\*</sup>*Collema bachmanianum* (Fink) Degel. A18 (46177), E1 (46217). This is a considerable extension of the range northeastward from the previously known arctic sites at Coppermine and Churchill.  
<sup>+</sup>*C. tenax* (Sw.) Ach. A4 (46057).  
*Cornicularia aculeata* (Schreb.) Ach. E1 (46210).  
<sup>+</sup>*C. divergens* (Ach.) Ach. A2 (46031), E8 (46270).  
<sup>+</sup>*C. muricata* (Ach.) Ach. A3 (46044), A5 (46075), E7 (46262).  
*D. ramulosa* (Hook.) Nyl. A17 (46164), E9 (46272).  
<sup>+</sup>*Dermatocarpon lachneum* (Ach.) A.L. Smith. A10 (46111).  
<sup>\*\*</sup>*Evernia perfragilis* Llano A4 (46051), E1 (46198).  
<sup>+</sup>*Fulgensia bracteata* (Hoffm.) Räs. A2 (46014), A10 (46110), A12 (46126), A18 (46168), E1 (46224), E3 (46245), E9 (46274).  
<sup>+</sup>*Glypholecia scabra* (Pers.) Müll. Arg. A4 (46315). This is a rare species better known from western North America, including Alaska and the Anderson River, N.W.T.  
*Huilia macrocarpa* (DC.) Hertel. E1 (46456).  
<sup>+</sup>*Hypogymnia subobscura* (Vain.) Poelt. A10 (46108), A11 (46119), A18 (46171), A21 (46183), E1 (46213), E7 (46257a).  
<sup>+</sup>*Jonaspis epulotica* (Ach.) Th. Fr. var. *arctica* (Lyngé) Magn. E1 (46468), E8 (46541).  
<sup>+</sup>*Lecanora atosulphurea* (Wahlenb.) Ach. A23 (46432), det. by H. Vänskä.  
<sup>\*\*</sup>*L. badia* (Pers.) Ach. A16 (46390), E8 (46529).  
<sup>\*\*</sup>*L. cenisia* Ach. A16 (46402), E2 (46490).  
*L. cladonioides* Lyngé E2 (46502).  
<sup>+</sup>*L. congesta* Lyngé A14 (46369). A rare high arctic species known from Greenland and Ellesmere Island.  
<sup>+</sup>*L. crenulata* (Dicks.) Nyl. A1 (46288), A7 (46336), A14 (46350).  
<sup>+</sup>*L. dispersa* (Pers.) Sommerf. A1 (46286).  
<sup>+</sup>*Lecanora epibryon* (Ach.) Ach. A2 (46039), A5 (46073), A7 (46096), A16 (46148), A17 (46159), E1 (46207), E3 (46250).  
<sup>\*\*</sup>*L. groenlandica* Lyngé A14 (det. uncertain), E2 (46511).  
<sup>\*</sup>*L. occidentalis* (Lyngé) Lyngé E2 (46498). A rare species known from Greenland, Hudson's Bay, and the Alps in Europe (Poelt 1975). The epithecium and upper hymenium of this have an unusual K+ bluish reaction.  
<sup>\*\*</sup>*L. palanderi* Vain. A5 (46082), E1 (46200).  
<sup>+</sup>*L. polytropa* (Ehrh.) Rabenh. A2 (46296), A11 (46345), A14 (46358), A21 (46429), A23 (46439), E1 (46462), E2 (46491), E6 (46517).  
<sup>+</sup>*L. rupicola* (L.) Zahlbr. A18 (46124), A21 (46419).  
<sup>+</sup>*L. superfluens* Magn. A13 (46130).  
<sup>\*</sup>*L. torrida* Vain. E1 (46466), E2 (46505).  
<sup>+</sup>*Lecidea* sp. Site A23 (46445). The specimen possibly represents an undescribed species. It has a very tiny dark gray thallus, radiate, K-, C- I+ blue. The excipular margin is thin and black with its interior purplish brown and radiate, the subhymenium hyaline and inspersed, the epithecium green black, the paraphyses subcapitate, the spores 15 × 6 μ. Growing on rock.  
<sup>+</sup>*Lecidea arctogena* Th. Fr. A20 (46414), A23 (46434).  
<sup>\*\*</sup>*L. armeniaca* (DC.) Fr. A16 (46393), E8 (46538).  
<sup>+</sup>*L. assimilata* Nyl. A2 (46008), A5 (46076), A16 (46146), A17 (46154).  
<sup>\*</sup>*L. atromarginata* Magn. E2 (46499).  
*L. auriculata* Th. Fr. A16 (46391), A23 (46440), E1 (46452), E8 (46533).  
<sup>+</sup>*L. brachyspora* Th. Fr. A16 (46388). This is a rare species. Hertel (1977) has a map in which it appears in the vicinity of Lake Athabasca. He later reported it from Alaska on the basis of a specimen collected by Thomson. Otherwise it has been reported from Europe and Spitzbergen. Fries (1879) reported it from Floeberg Beach, Grant Land.  
<sup>+</sup>*L. confluens* (Web.) Ach. A4 (46305), A6 (46326), A16 (46392).  
<sup>+</sup>*L. cuprea* Sommerf. A12 (46128).  
<sup>+</sup>*L. glaucophaea* Körb. A6 (46329).  
<sup>+</sup>*L. lapidica* (Ach.) Ach. A7 (46335), A16 (46405), A21 (46428), A23 (46446), E1 (46477).  
<sup>\*\*</sup>*L. limosa* Ach. A3 (46048), A5 (46074), E9 (46277).  
<sup>+</sup>*L. lulensis* (Hellb.) Th. Fr. A20 (46412), E8 (46530). This specimen is close to f. *epichlora* Vain. as the epithecium and upper hymenium are blue.  
<sup>\*\*</sup>*L. marginata* Schaer. A2 (46293), A4 (46307), A5 (46317), A14 (46360), A16 (46401), A21 (46430), A23 (46438), E1 (46453).  
*L. pauperula* Th. Fr. E8 (46536).  
<sup>+</sup>*L. picea* Lyngé A2 (46294), E8 (46527).  
<sup>+</sup>*L. ramulosa* Th. Fr. A5 (46071), A9 (46102), A12



- (46217), A21 (46191), E9 (46278).
- \**L. sublimosa* Nyl. E1 (46208). This species appears to be new to North America. It was described from Lawrence Bay on the Bering Straits and is known from Novaya Zemlya and Lapland in Sweden. It resembles *L. limosa* but has a varnish-like thallus, hyaline hypothecium, and larger spores  $18-25 \times 8-9 \mu$ . The hymenium is lower, 65 rather than 100  $\mu$ .
- +*L. tenuissima* Lynge A18 (46175). The hypothecium and exciple are beautifully violaceous as described by Lynge. This is the second report for this species described from Greenland.
- +*L. tessellata* (Ach.) Flörke A2 (46297), A11 (46343), A16 (46387), E1 (46467), E2 (46506), E6 (46519).
- \**L. tessellata* var. *caesia* (Anzi) Arn. E1 (46463).
- \**L. ultima* Th. Fr. E1 (46476).
- \*\**L. umbonata* (Hepp) Hertel A23 (46447), E2 (46504).
- +*L. vorticosa* (Flörke) Körb. A14 (46357), E6 (46522).
- \**Lecidella spitzbergensis* (Lynge) Hertel & Leuck. E6 (46523). Hertel (1970) reported this rare arctic alpine species from Alberta and Wyoming. It is also known from Europe, Iran, and China as well as Spitzbergen.
- +*L. stigmata* (Ach.) Hertel & Leuck. A1 (46279), A2 (46300), A6 (46330), A11 (46342), A14 (46361), A16 (46386), A20 (46415), A21 (46424), E1 (46455), E2 (46495), E6 (46520), E8 (46534, 46535).
- +*L. wulfenii* (Hepp) Körb. A3 (46047).
- +*Leciophysma finmarkicum* Th. Fr. A2 (46027).
- +*Lepraria arctica* Lynge A13 (46135).
- +*Leptogium arcticum* Jörg. A2 (46035).
- L. lichenoides* (L.) Zahlbr. E1 (46227).
- +*L. cf. tenuissimum* (Dicks.) Fr. A17 (46161).
- \**Massalonia carnosa* (Dicks.) Körb. E1 (46204), E7 (46261).
- Neuropogon sulphureus* (Koenig) Hellb. E8 (46269).
- +*Ochrolechia frigida* (Sw.) Lynge A13 (46129), A16 (46147), A17 (46162), E1 (46203), E7 (46256); E9 (46275).
- +*O. upsaliensis* (L.) Mass. A17 (46163).
- \*\**Omphalodiscus decussatus* (Vill.) Schol. A5 (46321), A6 (46328), A16 (46395), A23 (46441), E2 (46424), E8 (46271).
- \**O. krascheninnikovii* (Sav.) Schol. E2 (46243).
- +*O. virginis* (Schaer.) Schol. A4 (46054), A5 (46065), A11 (46120), E2 (46492), E7 (46260).
- +*Pachyospora verrucosa* (Ach.) Mass. A5 (46081), A13 (46133), A21 (46186), E1 (46206), E7 (46255). The report of *Pertusaria freyi* var. *monosticha* in Schuster, Steere, Thomson (1959) is an error based on this species.
- \*\**Parmelia elegantula* (Zahlbr.) Szat. (*Melanelia elegantula* (Zahlbr.) Essl.), A14 (46366), A23 (46193), E1 (46230), E7 (46258).
- P. infumata* Nyl. (*Melanelia infumata* (Nyl.) Essl.) A11 (46123), A17 (46166).
- +*P. omphalodes* (L.) Ach. A17 (46165), A18 (46170).
- Peltigera aphthosa* (L.) Willd. A1 (46003), A2 (46010), A3 (46046), A5 (46067), A9 (46103), A13 (46103), A17 (46156).
- +*P. canina* (L.) Willd. A9 (46097), A11 (46114), E1 (46225), E7 (46264).
- +*P. canina* var. *rufescens* (Weis.) Mudd A3 (46043), A9 (46104), A13 (46138), A17 (46153), A21 (46182).
- +*P. occidentalis* (Dahl) Krist. A2 (46024). This is a rare species known currently from Iceland, Greenland, and Bathurst Inlet, N. W. T., as well as this specimen from Axel Heiberg Island. A report from Alberta was based on a misidentification.
- +*P. polydactyla* (Neck.) Hoffm. A9 (46109).
- +*Pertusaria coriacea* (Th. Fr.) Th. Fr. A2 (46007), A5 (46077), A6 (46091), A9 (46099), A23 (46195), E1 (46209).
- +*P. dactylina* (Ach.) Nyl. A17 (46149), A21 (46185).
- +*P. panyrga* (Ach.) Mass. A5 (46087), A7 (46095).
- +*Phaeorrhiza nimbosea* (Fr.) Mayrh. & Poelt A2 (46042), E1 (46233).
- +*Physcia caesia* (Hoffm.) Hampe A1 (46280), A2 (46301), A13 (46131), A14 (46346), E1 (46214), E6 (46514), E7 (46254).
- +*P. dubia* (Hoffm.) Lettau A2 (46026), A4 (46061), E1 (46214).
- +*Physconia muscigena* (Ach.) Poelt A2 (46009), A3 (46050), A4 (46052), A11 (46115), A13 (46136), A21 (46189), E1 (46221), E3 (46247), E7 (46257b), E9 (46276).
- +*Placopsis gelida* (L.) Lindsay A11 (46344), A14 (46353).
- Placynthium aspratile* (Ach.) Henss. E6 (46512).
- +*Pseudephebe minuscula* (Nyl. ex Arn.) Brodo & Hawksw. A5 (46319), A21 (46425), A23 (46436), E2 (46240), E8 (46526).
- P. pubescens* (L.) Choisy A2 (46032), A5 (46318), E8 (46525).
- +*Psora rubiformis* (Ach.) Hook. A1 (46000), A11 (46117).
- +*Psoroma hypnorum* (Vahl) S. Gray A17 (46155).
- +*Rhizocarpon badioatrum* (Flörke) Th. Fr. A16 (46408).
- +*R. disporum* (Naeg.) Müll. Arg. A2 (46298), A4 (46316), A6 (46324), A14 (46363), A21 (46423), E1 (46464), E2 (46507), E8 (46539).
- R. geographicum* (L.) DC. A2 (46299), A16 (46398), E1 (46478), E2 (46483), E8 (46532).
- +*R. parvum* Runem. A16 (46399). Previously known from Greenland, Ellesmere Island, Richardson Island in Coronation Gulf, and the east coast of

- Hudson's Bay.
- \*+ *R. pusillum* Runem. A21 (46418), E1 (46474). This is a very interesting tiny species which commences on the thallus of *Sporostatia testudinea*. It is known from the high mountains of southern Europe and has been previously reported from Alaska and the Yukon.
- R. superficiale* (Schaer.) Vain. A2 (46291), A4 (46311), A5 (46323), A6 (46325), A14 (46356), A16 (46384), A20 (46413), A21 (46422), A23 (46443), E2 (46483), E8 (46531).
- + *Rhizoplaca melanophthalma* (Ram.) Leuck. & Poelt A2 (46006), A14 (46372), E2 (46494), E7 (46253).
- \*+ *Rinodina occidentalis* Lynge A21 (46426), E1 (46461).
- + *R. roscida* (Sommerf.) Arn. A2 (46022), A4 (46060), A5 (46064).
- + *R. turfacea* (Wahlenb.) Körb. A2 (46021), A5 (46068), A21 (46190), E1 (46216).
- + *Sarcogyne simplex* (Dav.) Nyl. A4 (46310), A11 (46339), A14 (46351), E1 (46460).
- \*+ *Solorina bispora* Nyl. A2 (46029), A9 (46106), A13 (46137), E1 (46199).
- + *Spilonema revertens* Nyl. A2 (46036).
- Sporostatia testudinea* (Ach.) Mass. A2 (46292), A4 (46309), A5 (46320), A6 (46332), A14 (46354), A16 (46383), A20 (46310), A21 (46320), A23 (46435), E1 (46449), E2 (46489), E6 (46515), E8 (46528).
- \* *Squamarina lentigera* (Web.) Poelt E5 (46252).
- \*+ *Staurothele arctica* Lynge A11 (46338), E2 (46501).
- + *S. clopima* (Wahlenberg.) Th. Fr. A11 (46341), A14 (46349).
- + *Stereocaulon alpinum* Laur. A9 (46101), A13 (46134).
- + *S. glareosum* (Sav.) Magn. A2 (46004), A3 (46045), A5 (46079), A10 (46109), A11 (46121), E1 (46223), E3 (46246).
- + *S. groenlandicum* (Dahl) Lamb A16 (46143). Contains atranorin and anziaic acid in GE tests.
- + *S. rivulorum* Magn. A17 (46151), A21 (46188).
- + *Thamnomia subuliformis* (Ehrh.) W. Culb. A4 (46052), A7 (46092), A12 (46125), A16 (46146), A18 (46169), A21 (46181), E1 (46235).
- T. vermicularis* (Sw.) Ach. A2 (46015).
- + *Toninia caeruleonigricans* (Lightf.) Th. Fr. A2 (46005), A11 (46116), E1 (46215), E3 (46248), E7 (46258).
- + *T. cumulata* (Sommerf.) Th. Fr. A2 (46020).
- + *T. tristis* Th. Fr. A1 (46002).
- + *Trapelia coarctata* (Smith & Sowerby) Choisy A16 (46389).
- + *Tremolecia atrata* (Ach.) Hertel A4 (46312), A5 (46322), A16 (46382), A20 (46411), E2 (46487), E8 (46540).
- + *Umbilicaria cylindrica* (L.) Del. ex Duby A4 (46303).
- \*+ *U. havaasii* Llano A5 (46085), E1 (46229).
- + *U. hyperborea* (Ach.) Hoffm. A16 (46141a).
- + *Verrucaria arctica* Lynge A14 (46364), E1 (46459, 46485).
- \* *V. margacea* Wahlenb. E1 (46483).
- + *Xanthoparmelia centrifuga* (L.) Hale A2 (46019), A21 (46178).
- + *X. separata* (Th. Fr.) Hale A9 (46105), A17 (46152), A21 (46180).
- + *Xanthoria candelaria* (L.) Th. Fr. A2 (46301a), A4 (46053), A14 (46368), E2 (46244).
- X. elegans* (Link) Th. Fr. A1 (46284), A2 (46301b), A4 (46304), A6 (46327), A11 (46340), A14 (46375), A21 (46421), E1 (46465), E6 (46513).
- + *X. elegans* var. *splendens* (Darb.) Christ. ex Poelt A6 (46088), E1 (46211), E8 (46267).
- X. soreliata* (Vain.) Poelt. A14 (46347).

### Lichen Parasites

- Discothecium gemmiferum* Vouax. On *Sporostatia testudinea*, A16 (46385).
- Rhabdospora lecanorae* Bouly de Lesd. On *Lecanora polytropa*, A14 (46352).
- Tichothecium pygmaeum* Körb. On *Lecidea auriculata*, A23 (46442).

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